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ment of existing laws, for the purpose of securing the enactment of legislation necessary to provide for a separate classification as dealers in alcohol and narcotic drugs, with the requirement that dealers in this class keep a record sufficient to show the amount of alcohol or alcohol-containing materials purchased, and thus afford to officials in prohibition or local-option territory an opportunity to actually enforce this type of restrictive legislation in a way hitherto impossible.

## PLAGUE ERADICATION IN CALIFORNIA.

### PRESENT SITUATION—THE DISEASE APPARENTLY ERADICATED.

By J. D. LONG, Surgeon, United States Public Health Service.

In order that a clear understanding may be had of the present situation with regard to plague in the State of California it will be necessary to review briefly the past history of plague in the State.

Plague was first reported in California about the year 1900, and from that time until 1904 cases occurred from time to time.

From 1904 until 1907 no case was reported.

In May, 1907, a sporadic case was reported at the Marine Hospital. The outbreak proper began in August, 1907, and continued in the city of San Francisco until January, 1908. During this period 159 human cases occurred. During the same period 15 cases occurred in Oakland, 1 in Berkeley, and 1 in Point Richmond. During the period from 1908 until the present time cases have occurred as follows in the counties outside of the cities above mentioned:

	Cases.
Contra Costa County-----	4
Alameda County-----	2
Los Angeles County-----	1
San Benito County-----	2
Santa Clara County-----	1
San Joaquin County-----	1

Total number of cases, 187.

In the last human case of plague to occur in California the patient sickened at Walnut Creek, Contra Costa County, in May, 1914, and made an uneventful recovery. This case was mild and atypical.

During the period from August, 1907, to October, 1908, 398 plague-infected rats were found in the city of San Francisco, and from September, 1907, to December 1, 1908, 125 plague-infected rats were found in the city of Oakland.

In August, 1908, the discovery was made that plague existed among the ground squirrels, which have heretofore so plentifully infested the lands comprised in the rural districts of California. Since that time

a total of 1,957 plague-infected squirrels has been found, scattered over an area of approximately 13,000 square miles, which comprises the counties of Contra Costa, Alameda, San Joaquin, Stanislaus, Santa Clara, Santa Cruz, Monterey, San Benito, and Merced.

From August, 1908, to the beginning of 1912 the efforts of the United States Public Health Service and the California State Board of Health, acting in cooperation, were directed toward outlining or delimiting the area in which plague infection existed. For this purpose, hunting operations were conducted all over the State of California and in portions of Oregon, Nevada, and Arizona. No infection was found in any part of California except in the nine counties mentioned above, nor was infection found in any of the other States referred to.

As soon as it was definitely known that plague infection was confined to the nine counties of central California, operations were discontinued in the other portions of the State, and since 1912 a consistent effort has been made to bring about as complete a destruction of ground squirrels as possible, in order to insure the elimination of the disease.

For about a year, though steady progress was made, and fair work was done, results of a satisfactory nature could not be obtained on account of the fact that the funds of the State were very low and adequate legislation did not exist. On August 12, 1913, the present contagious disease act became effective, the same having been passed by the legislature and approved by the governor on June 7, 1913. This act provided sufficient funds and adequate legislation. Since that time, the work has progressed in a very satisfactory manner, and it is now believed that the desired result has been accomplished.

Plague infection has been found among ground squirrels over a total of 140,000 acres. In order to insure its complete eradication it has been necessary to destroy squirrels not only upon the infected and immediately adjoining land but effectively to diminish the number of squirrels in the other infected counties as well. Recognizing this fact, the State board of health passed a resolution declaring that the nine infected counties constituted an existing focus of contagious or infectious disease. In this manner the contagious disease act was made applicable over the entire infected area.

Since July 1, 1913, 3,100,000 acres have been treated, and squirrels have been diminished by about 90 or 95 per cent. On the actually infected and immediately adjoining land, a much higher percentage of squirrel destruction has been obtained, squirrels having been reduced to the point that hunters must cover 26 acres of land in order to obtain 1 squirrel. As the hunters are able to shoot about 15 per cent of the squirrels they see, the average infestation now is

probably about 1 squirrel to 4 acres, whereas, prior to the institution of squirrel destruction measures the average infestation on the infected and adjoining property probably was about 10 or 15 squirrels to the acre. In some portions infestations averaged as high as 50 or 60 to the acre, and in one instance averaged 140 to the acre, over an area of 12,000 acres.

During the year 1914 plague has been found in California as follows:

Human cases, 1; occurred at Walnut Creek, Contra Costa County.

Rat cases, none.

Squirrel cases, 69; located as given below:

San Benito County: Two foci. First focus, two adjoining ranches, 3 infected squirrels; second focus, one ranch, 8 infected squirrels.

Monterey County: One focus, one ranch, 1 infected squirrel.

Contra Costa County: Three foci. First focus, 2 ranches, 5 infected squirrels; second focus, 1 ranch, 1 infected squirrel; third focus, 12 adjoining ranches, 32 infected squirrels.

Alameda County: One focus. Two adjoining ranches, 19 infected squirrels.

Total: Seven foci, 21 ranches, 69 infected squirrels.

All of the above ranches have been thoroughly treated and hunted over in a most intensive manner from three to five times, with the result that on only one ranch was a plague squirrel found after eradication measures were thought to be completed. In this instance, the disease could not have spread, as so few squirrels were left on the ranch that a hunter was able to obtain only one additional squirrel. The area of the ranch is about 700 acres.

To illustrate the manner in which plague infection has diminished during the last three years, the following hunting data are given:

Hunting season.	Ranches hunted over.	Squirrels shot.	Infected ranches.	Infected squirrels.	Percent- age of infection.
1912.....	1,727	29,144	86	902	0.3
1913.....	1,839	22,464	68	419	1.86
1914.....	2,566	22,990	21	69	.5

As previously stated, since the discovery of plague among ground squirrels, in August, 1908, its presence has been demonstrated on 258 ranches. All of these ranches, and all ranches adjoining for some distance around, have been so thoroughly treated that squirrels are, to all practical purposes, eradicated. In addition, hunting was done in the following manner, to make sure that no plague infection remained:

1. All ranches on which plague was found in 1914 have been hunted from three to five times, with intervals between the hunting operations.

2. All ranches on which plague was found in 1913, but not in 1914, were treated and hunted over from two to four times, with intervals between operations.

3. All ranches on which plague was found in 1912, or previous years, but not in 1913 or 1914, were hunted over from one to three times, as conditions indicated, with intervals between operations.

In 1912, in order to learn whether it was possible to eradicate squirrels to the point that plague could no longer exist among them, the Altamont district of Alameda County, comprising 23,000 acres which had an infection, at times as high as 10 per cent of squirrels shot, was so thoroughly treated that about 90 per cent of the squirrels in that locality were destroyed. After the completion of these operations, hunters were stationed there. These hunters have sent squirrels to the laboratory continuously for two years, without a single infected squirrel being found. From this experience, therefore, and from other experiences similar in all respects, except for the length of time involved, it is believed that squirrels can be so reduced in number as to cause the disappearance of plague.

From all that has preceded, the following facts may be elicited:

1. Ground squirrels can be so reduced in numbers that plague can not be discovered among them.
2. Squirrels have been reduced 90 per cent over an area of 3,100,000 acres.
3. Squirrels have been, to all practical purposes, eradicated from an area of 250,000 acres, which comprised all infected ranches and the ranches immediately surrounding or adjoining.
4. After the completion of squirrel-extermination operations on infected land, in only one instance has hunting of the most intensive character revealed the presence of plague among the few squirrels that had escaped destruction.

In view of the facts just set forth, it is believed that the statement can safely be made that all discoverable plague has been eradicated from the State of California, and that danger of its further spread has been removed.

Observation over all of the infected counties will still be maintained, and vigorous efforts continued, to make the destruction of squirrels as complete as possible. Hunting will again be resumed with the opening of the next breeding season, and if no infection is then discovered, the statement can be made with certainty that no plague exists in the State of California.

As a result of the work that has been accomplished in the destruction of ground squirrels in the State of California, economic benefits have accrued to landowners far beyond the expectations of any of those who have been at all interested in the work. A number of circulars have been sent broadcast over the counties in which infection had heretofore existed, with the request that landholders indicate the benefits that have accrued to them as a result of squirrel destruction. Sufficient time has not yet elapsed to be able to make any definite statement in this regard, but, out of about 250 replies that have been received, it is noted that farmers have received, in increased crops,

in conservation of pasturage, and in reduction of expenditures for repairs to irrigation ditches, canal banks, etc., amounts varying from 100 per cent to 1,000 per cent of the amounts expended for the destruction of squirrels that infested their lands.

Still further, the conduct of the present campaign for the eradication of bubonic plague and the destruction of ground squirrels has constituted a new departure in sanitation, in that 25 per cent of the expense incurred returns to the State. In accordance with the contagious-disease act, if an owner of squirrel-infested land, after receiving a legal notice to destroy the squirrels on his land, fails, refuses, or neglects to comply with the same, the State proceeds to do the work and charge the cost of the same against the land. If the bill is not paid when presented, a lien is eventually filed against the land, and it is sold to pay the amount of the lien and the costs. So far no land has had to be sold. In the majority of instances, bills rendered have been paid without question, or the statement has been made that reimbursement would be made in the course of a short time. In the end, it is estimated that the State of California will receive, in the form of reimbursements, approximately 25 per cent of the amount that has been expended by the State during the past year for plague eradication and squirrel destruction.

It is estimated that since July 1, 1913, 20,150,000 squirrels have been destroyed. The average cost of labor and material, per acre, has been 17.4 cents.

Farmers, ranchers, and landowners generally are enthusiastic as to the benefits received, and have brought and are bringing pressure to bear upon their boards of supervisors to insure the continuance of the work for economic reasons until ground squirrels are ultimately destroyed.

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### PHYSICAL EXAMINATION OF WORKERS.<sup>1</sup>

By J. W. SCHERESCHEWSKY, Surgeon, United States Public Health Service.

The spirit of individualism is rapidly passing out of modern society, to be replaced by an increasing solicitude for methods which aim at greater cooperation between various social units, the better conservation of human life and health, and an increasing recognition of the importance of the individual to society at large.

We are gradually coming to a realization of the fact that continued industrial prosperity is not dependent, in the last analysis, upon the tons of raw material consumed nor the money value of the finished product, but upon the physical efficiency of the worker and the length of the period of his economic productivity.

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<sup>1</sup> Read before the Session on Industrial Hygiene, Third Annual Congress of the National Council for Industrial Safety, Chicago, Ill., Oct. 12-15, 1914.